What is claimed is:

1. A flow meter comprising:

a loop power supply for supplying a supply voltage;

a load powered by a load voltage and including at least a processor for calculating a flow rate, an ultrasonic transducer power circuit, and an ultrasonic transducer receiving circuit;

a power regulating circuit between the loop power supply and the load, the power regulating circuit including:

a power converter responsive to the supply voltage to vary the load voltage in response to a control signal,

a safe storage device between the power converter and the load for storing power when not needed by the load and for delivering power to the load when required by the load, and

a control subsystem for providing the control signal to the converter based on the setting of the loop power supply by the load; and

a power management subsystem configured to detect the load voltage and to reduce the load power consumption at at least one predetermined set point.

2. The flow meter of claim 1 in which the loop power supply is a 4-20 mA loop power supply.

3. The flow meter of claim 1 in which the power converter is a switching

power converter.

4. The flow meter of claim 1 in which the safe storage device is a capacitor.

5. The flow meter of claim 4 in which the capacitor has a value of less than 100 μF.

6. The flow meter of claim 1 in which the control subsystem includes a control amplifier with one input connected to the loop power supply and another input connected to a reference voltage.

7. The flow meter of claim 6 in which the processor is programmed to output the reference voltage to the control amplifier based on the flow rate.

8. The flow meter of claim 1 in which the power regulating circuit further includes a voltage clamp between the converter and the load for limiting the load voltage.

9. The flow meter of claim 8 in which the voltage clamp is a Zener diode.

10. The flow meter of claim 1 in which the power management subsystem includes a low level power management section.

11. The flow meter of claim 10 in which the low level power management

section includes at least a first voltage detector configured to compare the load voltage with a first set point voltage and to output a first warning signal to the processor when the load voltage is less than the first set point voltage.

12. The flow meter of claim 11 in which the processor is programmed to initiate a first power reduction instruction set in response to the first warning signal to reduce the load power consumption.

13. The flow meter of claim 12 in which the low level power management section further includes a second voltage detector configured to compare the load voltage with a second set point voltage and to output a second warning signal to the processor when the load voltage is less than the second set point voltage.

14. The flow meter of claim 13 in which the processor is programmed to initiate a second power reduction instruction set in response to the second warning signal to further reduce the load power consumption.

15. The flow meter of claim 10 in which the power management subsystem further includes a high level power management section.

16. The flow meter of claim 15 in which the high level power management section is configured to measure the power draw of selected modules of the load and to implement a rules set to regulate the operation of the modules based on the power draw

of each module.

17. The flow meter of claim 1 further including transducers connected to the load.

18. The flow meter of claim 17 in which each transducer includes a composite piezoelectric element.

19. The flow meter of claim 18 in which the composite piezoelectric element includes an array of cells isolated from each other by channels filled with potting material.

20. The flow meter of claim 1 further including one or more batteries for powering the loop power supply.

21. The flow meter of claim 1 further including one or more solar cells for powering the loop power supply.

22. A flow meter comprising:

a loop power supply for supplying a supply voltage;

a load powered by a load voltage and including at least a processor for calculating a flow rate, an ultrasonic transducer power circuit, and an ultrasonic transducer receiving circuit;

a power regulating circuit between the loop power supply and the load; and

a power management subsystem configured to detect the load voltage and to reduce the power consumption at at least one predetermined set point.

23. The flow meter of claim 22 in which the power regulating circuit includes:

a power converter responsive to the supply voltage to vary the load voltage in response to a control signal;

a safe storage device for storing power when not needed by the load and for delivering power to the load when needed by the load; and

a control subsystem for providing the control signal to the converter based on the setting of the loop power supply by the load.

24. The flow meter of claim 22 in which the loop power supply is a 4-20 mA loop power supply.

25. The flow meter of claim 23 in which the power converter is a switching

power converter.

26. The flow meter of claim 23 in which the safe storage device is a capacitor.

27. The flow meter of claim 26 in which the capacitor has a value of less than 100 μF.

28. The flow meter of claim 23 in which the control subsystem includes a control amplifier with one input connected to the loop power supply and another input connected to a reference voltage.

29. The flow meter of claim 28 in which the processor is programmed to output the reference voltage to the control amplifier based on the flow rate.

30. The flow meter of claim 23 in which the power regulating circuit further includes a voltage clamp between the regulator and the load for limiting the load voltage.

31. The flow meter of claim 30 in which the voltage clamp is a Zener diode.

32. The flow meter of claim 22 in which the power management subsystem includes a low level power management section.

33. The flow meter of claim 32 in which the low level power management

section includes at least a first voltage detector configured to compare the load voltage with a first set point voltage and to output a first warning signal to the processor when the load voltage is less than the first set point voltage.

34. The flow meter of claim 33 in which the processor is programmed to initiate a first power reduction instruction set in response to the first warning signal to reduce the load voltage.

35. The flow meter of claim 34 in which the low level power management section further includes a second voltage detector configured to compare the load voltage with a second set point voltage and to output a second warning signal to the processor when the load voltage is less than the second set point voltage.

36. The flow meter of claim 35 in which the processor is programmed to initiate a second power reduction instruction set in response to the second warning signal to further reduce the load voltage.

37. The flow meter of claim 32 in which the power management subsystem further includes a high level power management section.

38. The flow meter of claim 37 in which the high level power management section is configured to measure the power draw of selected modules of the load and to implement a rules set to regulate the operation of the modules based on the power draw

of each module.

39. The flow meter of claim 22 further including transducers connected to the load.

40. The flow meter of claim 39 in which each transducer includes a composite piezoelectric element.

41. The flow meter of claim 40 in which the composite piezoelectric element includes an array of cells isolated from each other by channels filled with potting material.

42. The flow meter of claim 22 further including one or more batteries for powering the loop power supply.

43. The flow meter of claim 22 further including one or more solar cells for powering the loop power supply.

44. A flow meter comprising:

a loop power supply for supplying a supply voltage;

a load powered by a load voltage and including at least a processor for calculating a flow rate, an ultrasonic transducer power circuit, and an ultrasonic transducer receiving circuit; and

a power regulating circuit between the loop power supply and the load, the power regulating circuit including:

a power converter responsive to the supply voltage to vary the load voltage in response to a control signal,

a safe storage device for storing power when not needed by the load and for delivering power to the load when required by the load, and

a control subsystem for providing the control signal to the converter based on the setting of the loop power supply by the load.

45. The flow meter of claim 44 in which the loop power supply is a 4-20 mA loop power supply.

46. The flow meter of claim 44 in which the power converter is a switching voltage regulator.

47. The flow meter of claim 44 in which the safe storage device is a capacitor.

48. The flow meter of claim 47 in which the capacitor has a value of less than 100 μF.

49. The flow meter of claim 44 in which the control subsystem includes a control amplifier with one input connected to the loop power supply and another input connected to a reference voltage.

50. The flow meter of claim 49 in which the processor is programmed to output the reference voltage to the control amplifier based on the flow rate.

51. The flow meter of claim 44 in which the power regulating circuit further includes a voltage clamp between the converter and the load for limiting the load voltage.

52. The flow meter of claim 51 in which the voltage clamp is a Zener diode.

53. The flow meter of claim 44 further including a power management subsystem configured to detect the load voltage and to reduce the load voltage in response to at least one predetermined set point.

54. The flow meter of claim 52 in which the power management subsystem includes a low level power management section.

55. The flow meter of claim 54 in which the low level power management

section includes at least a first voltage detector configured to compare the load voltage with a first set point voltage and to output a first warning signal to the processor when the load voltage is less than the first set point voltage.

56. The flow meter of claim 55 in which the processor is programmed to initiate a first power reduction instruction set in response to the first warning signal to reduce the load voltage.

57. The flow meter of claim 56 in which the low level power management section further includes a second voltage detector configured to compare the load voltage with a second set point voltage and to output a second warning signal to the processor when the load voltage is less than the second set point voltage.

58. The flow meter of claim 57 in which the processor is programmed to initiate a second power reduction instruction set in response to the second warning signal to further reduce the load voltage.

59. The flow meter of claim 53 in which the power management subsystem includes a high level power management section.

60. The flow meter of claim 59 in which the high level power management section is configured to measure the power draw of selected modules of the load and to implement a rules set to regulate the operation of the modules based on the power draw

of each module.

61. The flow meter of claim 44 further including transducers connected to the load.

62. The flow meter of claim 61 in which each transducer includes a composite piezoelectric element.

63. The flow meter of claim 62 in which the composite piezoelectric element includes an array of cells isolated from each other by channels filled with potting material.

64. The flow meter of claim 44 further including one or more batteries for powering the loop power supply.

65. The flow meter of claim 44 further including one or more solar cells for powering the loop power supply.

66. A method of regulating power between a loop power supply and a load powered by a load voltage, the method comprising:

varying the load voltage in response to a control signal;

storing power when not needed for the load;

delivering stored power to the load when required to power the load;

adjusting the control signal based on the setting of the loop power supply;

detecting the load voltage; and

reducing the load voltage at a predetermined set point.

67. The method of claim 66 in which the loop power supply is a 4-20 mA loop power supply.

68. The method of claim 66 in which adjusting the control signal includes comparing the loop power supply to a reference voltage.

69. The method of claim 68 in which the reference voltage level is based on a flow rate.

70. The method of claim 66 further including clamping the load voltage at a predetermined limit.

71. The method of claim 66 in which reducing the load voltage includes

comparing the load voltage with a first set point voltage and outputting a first warning signal when the load voltage is less than the first set point voltage.

72. The method of claim 71 including initiating a first power reduction instruction set in response to the first warning signal to reduce the load voltage.

73. The method of claim 71 in which reducing the load voltage further includes comparing the load voltage with a second set point voltage and outputting a second warning signal when the load voltage is less than the second set point voltage.

74. The method of claim 73 including initiating a second power reduction instruction set in response to the second warning signal to further reduce the load voltage.

75. The method of claim 66 in which reducing the load voltage includes measuring the power draw of selected modules of the load and implementing a rules set to regulate the operation of the modules based on the power draw of each module.